In re Application of Wang et al.
Serial No. 09/895,429

In the Drawings:

Please replace Figures 13 and 15 with the replacement sheets that are enclosed herein with this amendment.

REMARKS

The Office action has been carefully considered. The Office action rejected claims 1, and 3-5 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,565,611 to Wilcox et al. ("Wilcox"). Further, the Office action rejected claims 6-7, 12-16, and 18-20 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,304,674 to Cass et al. ("Cass"). Further yet, the Office action rejected claims 21-24, 26, and 28-38 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,517,578 to Altman et al. ("Altman 1996"). Still further, the Office action rejected claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Wilcox in view of *A Tutorial on Support Vector Machines for Pattern Recognition*, 1998 by Burges, ("Burges"). The Office action rejected claims 8-11 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Cass in view of Burges. Finally, the Office action rejected claims 25 and 27-28 under 35 U.S.C. § 103(a) as being unpatentable over Altman 1996 in view of U.S. Patent Publication No. 2002/0064308A1 also to Altman et al. ("Altman 2002").

In addition to the claim rejections listed above, the Office action objected to informalities in claim 21 as well as the drawings and the specification. Applicants have amended claim 21, the drawings, and the specification accordingly to obviate the objections. Regarding the claim rejections, applicants respectfully disagree.

By present amendment, claims 21 and 34 have been amended for clarification and not in view of the prior art. Applicants submit that the claims as filed were patentable over the prior art of record, and that the amendments herein are for purposes of clarifying the claims and/or for expediting allowance of the

claims and not for reasons related to patentability. Reconsideration is respectfully requested.

Regarding the Office action's discussion about the mathematical tangent property, applicants point out that common semantics and parlance allows the applicants to use the term "tangent" as not only a reference to the mathematical property, but also as a shortened term for "tangential point." Thus, reading the term tangent in the cited portion of the applicants' specification to read as tangential point is unambiguous and clear. Applicants submit that this reading of the applicants' specification be used.

Applicants thank the Examiner for the interview held (by telephone) on August 16, 2005. During the interview, the Examiner and applicants' attorney discussed the claims with respect to the prior art. The essence of applicants' position is incorporated in the remarks below.

Prior to discussing reasons why applicants believe that the claims in this application are clearly allowable in view of the teachings of the cited and applied references, a brief description of the present invention is presented.

The present invention is directed to a method and system for separating text and drawings in a digital ink file (*e.g.*, a handwritten digital ink file). To this end, the present invention may provide a stroke analyzer that classifies single strokes that have been input by a user as either in a "text" class or in an "unknown" class. Further, a grouping component may be provided that attempts to group strokes so as to form text objects (*e.g.*, words, characters, or letters). The text objects may then be recognized or otherwise processed with more efficiency.

To perform the stroke analysis, in accordance with one aspect of the present invention, a model for curvature features for single strokes may be trained using a trainable classifier, such as a support vector machine (SVM). The curvature features are typically represented by a curvature vector. The curvature vector may include information obtained, for example, by a tangent histogram or discreet curvature calculation of a stroke. Using the trainable classifier, a single stroke may be classified in accordance with the stroke's curvature vector as either "text" or "unknown."

In accordance with another aspect of the present invention, after the strokes have been classified as text or unknown, strokes may be grouped on a spatial basis. The spatial grouping may be based upon how close single strokes were made relative to one another, a time stamp basis *(e.g.,* the proximity of time of creation of the stroke to the time of creation of other strokes), a combination of these, or based on other criteria. After strokes are grouped, a determination may be made as to whether the grouped text strokes are a text object (*e.g.,* a word or letter). The grouped strokes may also be analyzed contextually on a global basis. The global contextual analysis involves evaluating the strokes in the group against the strokes in the digital ink file, including those outside the stroke group. This evaluation aids in determining if one or more strokes are to be eliminated from and/or added to the text group.

Note that the above description is for example and informational purposes only, and should not be used to interpret the claims, which are discussed below.

§102 Rejections

Turning to the claims, independent claim 1 recites a computer-readable medium having computer-executable instructions, comprising, accessing a plurality of stroke samples, the stroke samples representing more than one class, extracting curvature features of each of the strokes for each class, and using the curvature features, training a trainable classifier to classify strokes for each class.

The Office action rejected claim 1 as being anticipated by Wilcox. More specifically, the Office action contends that Wilcox teaches accessing a plurality of stroke samples, the stroke samples representing more than one class. Column 3, lines 52-54, column 4, lines 19-21 and 63-67 and column 5, lines 1-9 of Wilcox are referenced. Further, the Office action contends that Wilcox teaches extracting curvature features of each of the strokes for each class. Column 5, line 37 of Wilcox is referenced. Finally, The Office action contends that Wilcox teaches using the curvature features, training a trainable classifier to classify strokes for each class. Column 5, lines 29-33 and Fig. 2 of Wilcox are referenced. Applicants respectfully disagree.

Wilcox is directed, generally, to a system for generating indexes for handwritten notes captured as digital ink in a computer. More specifically, the cited and applied section of Wilcox teaches recognition of sequences of strokes such that textual words and phrases may be recognized more easily. That is, not only does Wilcox teach recognizing individual symbols (*i.e.*, alphanumeric characters) but also attempts to take handwriting recognition to another level by recognizing combinations of symbols (*i.e.*, words and phases comprising alphanumeric

characters). As a result, once a user of the handwriting recognition system enters a series of alphanumeric characters more than once (*e.g.*, entering the term "3-D"), the system learns to recognize the term 3-D as an individual symbol, as opposed to three separate alphanumeric symbols.

Claim 1, however, recites accessing a plurality of stroke samples, the stroke samples representing more than one class and extracting curvature features of each of the strokes for each class. A class, in the context of the present invention, refers to a difference between types of symbols. In one class, alphanumeric characters may comprise letters, numbers, words and phrases, and may be referred to as a text class. In a different class, other non-alphanumeric symbols may be used for various handwritten drawings and/or figures (*i.e.*, circles, squares, schematics, *etc.*) and may comprise a drawing class. Thus, the method of claim 1 is able to distinguish between different classes of handwriting; text vs. drawings, for example.

Wilcox falls short of this in that Wilcox does not teach distinguishing between classes of handwriting. Rather, Wilcox teaches a single class (text) and provides for a means of recognizing strings of characters in the single class of handwriting. Despite the fact that Wilcox refers to recognized strings of alphanumeric characters (*e.g.*, 3-D) as a class, it is nothing more than different combinations of characters from the same class. Distinguishing between characters and combinations of characters in one single class, as disclosed by Wilcox, is not the same as distinguishing between different classes by accessing stroke samples representing more than one class as recited in claim 1. Applicants

submit that claim 1 is allowable over the prior art of record for at least the foregoing reasons.

Applicants respectfully submit that dependent claims 3-5, by similar analysis, are allowable. Each of these claims depends either directly or indirectly from claim 1 and consequently includes the recitations of independent claim 1. As discussed above, Wilcox fails to disclose the recitations of claim 1 and therefore these claims are also allowable over the prior art of record. In addition to the recitations of claim 1 noted above, each of these dependent claims includes additional patentable elements.

Turning to the next independent claim, claim 6 recites a computer-readable medium having computer-executable instructions, comprising, accessing a digital ink file having at least one stroke therein, extracting curvature features of the at least one stroke, and based upon the curvature features, determining whether the stroke is text.

The Office action rejected claim 6 as being anticipated by Cass. More specifically, the Office action contends that Cass teaches accessing a digital ink file having at least one stroke therein. Column 3, lines 36-37 of Cass is referenced. Further, the Office action contends that Cass teaches extracting curvature features of the at least one stroke. Column 4, lines 3-8 and Fig. 2 of Cass are referenced. Finally, the Office action contends that Cass teaches based upon the curvature features, determining whether the stroke is text. Column 3, lines 45-50 and column 4, lines 3-8 of Cass are referenced. Applicants respectfully disagree.

Cass is directed, generally, to a system for recognizing user specified gestures by using Hidden Markov Models to incrementally train an input recognition device. More specifically, the cited and applied section of Cass discloses a mode for which the system of Cass may be trained. As Cass is generally aware, handwriting may include different kinds of gestures and/or strokes. As discussed above with regard to the present invention, one distinction between classes may be distinguishing text from drawings. Cass teaches a gesture class select module that may be toggled between two different classes. In the example of Cass, a user may designate a letter class, a number class, or a shape class by setting the gesture class select module to the appropriate setting. Thus, the system disclosed in Cass cannot distinguish between classes via stroke analysis and must be told which class of characters will be input during a training mode. That is, in order for the system of Cass to recognize letters, it must be in a letter class recognition mode to begin with.

Claim 6, however, is directed to a method for actually distinguishing between classes without being in a specific mode as directed by a switch. In specific, claim 6 recites based upon the curvature features, determining whether the stroke is text. That is, the system of the present invention can actually distinguish between classes and does not need a manual class switch as is required by the system of Cass. In fact, the system of Cass is representative of the actual problem that the present invention seeks to remedy. Because the system of Cass necessarily requires a class switch to identify which class of input to expect, it cannot possibly be construed to teach determining whether the stroke is text based

upon curvature features as recited in claim 6. Applicants submit that claim 6 is allowable over the prior art of record for at least the foregoing reasons.

Turning to the next independent claim, claim 15 recites a computer readable medium having stored thereon a data structure, comprising a first data field comprising data representing information regarding a plurality of classes of digital ink strokes and a second data field comprising trained information regarding curvature features of each of the digital ink strokes.

The Office action rejected claim 15 as being anticipated by Cass. More specifically, the Office action contends that Cass teaches a first data field comprising data representing information regarding a plurality of classes of digital ink strokes. Fig. 8 of Cass is referenced. Further, the Office action contends that Cass teaches a second data field comprising trained information regarding curvature features of each of the digital ink strokes. Column 5, lines 2-9 and Figs. 4 and 6 of Cass are referenced. Applicants respectfully disagree.

As discussed above, Cass is directed, generally, to a system for recognizing user specified gestures by using Hidden Markov Models to incrementally train a input recognition device. More specifically, the cited and applied section of Cass discloses a mode for which the system of Cass may be trained. Cass teaches a gesture class select module that may be toggled between two different classes. In the example of Cass, a user may designate a letter class, a number class, or a shape class by setting the gesture class select module to the appropriate setting. Thus, the system disclosed in Cass cannot distinguish between classes and must be told which class of characters will be input during a training mode. That is, in

order for the system of Cass to recognize letters, it must be in a letter class recognition mode to begin with.

Claim 15, however, is directed to a data structure for actually distinguishing between classes without being in a specific mode as directed by a switch. In specific, claim 15 recites a first data field comprising data representing information regarding a plurality of classes of digital ink strokes and a second data field comprising trained information regarding curvature features of each of the digital ink strokes. That is, the present invention can actually distinguish between classes and does not need a class switch as is required by the system of Cass. In fact, the system of Cass is representative of the actual problem that the present invention seeks to remedy. Applicants submit that claim 15 is allowable over the prior art of record for at least the foregoing reasons.

Turning to the next independent claim, amended claim 21 recites a computer readable medium having computer-executable instructions, comprising, accessing a digital ink file having a plurality of strokes therein, determining a class for each of the plurality of strokes, and grouping some of the strokes based upon local characteristics of the strokes to form grouped strokes.

The Office action rejected claim 21 as being anticipated by Altman 1996. More specifically, the Office action contends that Altman 1996 teaches accessing a digital ink file having a plurality of strokes therein. Column 3, lines 60-61 and column 5, lines 10-20 of Altman 1996 is referenced. Further, the Office action contends that Altman 1996 teaches grouping some of the strokes based upon local

characteristics of the strokes to form grouped strokes. Figs. 3 and 4A-4B of Altman 1996 are referenced. Applicants respectfully disagree.

Altman 1996 is directed, generally, to a system for processing handwritten input into digital ink usable by a digital ink system. More specifically, the cited and applied section of Altman 1996 describes a method of grouping similar strokes together to form words, phrases and paragraphs. As such, a user may more easily implement digital ink within a word processing application. Altman 1996, however, does not distinguish between classes of digital ink data, such as distinguishing between text and drawings.

Amended claim 21, however, recites determining a class for each of the plurality of strokes. That is, claim 21 is directed to a method for distinguishing between different classes for digital ink data. Similar to the previous references, Altman 1996 falls short of this in that the groupings of similar strokes into words, phrases, and paragraphs remain wholly within a single class, namely a textual class. Altman 1996 does not teach determining a class for each of the plurality of strokes as recited in claim 21. Applicants submit that claim 21 is allowable over the prior art of record for at least the foregoing reasons.

Turning to the last independent claim, amended claim 34 recites a computer readable medium having computer-executable instructions, comprising accessing a digital ink file having a plurality of strokes therein, determining a class for each of the plurality of strokes, and grouping some of the strokes based upon characteristics of the plurality of strokes.

The Office action rejected claim 34 as being anticipated by Altman 1996. More specifically, the Office action contends that Altman 1996 teaches the recitations of claim 34 and cites the same rationale as cited with respect to the rejection of claim 21. Applicants respectfully disagree.

As discussed above, Altman 1996 is directed, generally, to a system for processing handwritten input into digital ink usable by a digital ink system. More specifically, the cited and applied section of Altman 1996 describes a method of grouping similar strokes together to form words, phrases and paragraphs. As such, a user may more easily implement digital ink within a word processing application. Altman 1996, however, does not distinguish between classes of digital ink data, such as distinguishing between text and drawings.

Amended claim 34, however, recites determining a class for each of the plurality of strokes. That is, claim 34 is directed to a method for distinguishing between different classes for digital ink data. Similar to the previous references, Altman 1996 falls short of this in that the groupings of similar strokes into words, phrases and paragraphs remain wholly within a single class, namely a textual class. Altman 1996 does not teach determining a class for each of the plurality of strokes as recited in claim 34. Applicants submit that claim 34 is allowable over the prior art of record for at least the foregoing reasons.

§103 Rejections

The Office action rejected several dependent claims under 35 U.S.C. § 103(a). More specifically, the Office action rejected claim 2 as being unpatentable over Wilcox in view Burges. The Office action rejected claims 8-11 and 17 as

being unpatentable over Cass in view of Burges. Finally, the Office action rejected claims 25 and 27-28 as being unpatentable over Altman 1996 in view of Altman 2002.

Each of these dependent claims depend from independent claims addressed previously with respect to the respective §102 rejection of the corresponding independent claims. As was explained above, the recitations of the independent claims are not taught by the respective references cited, (*i.e.*, Wilcox does not teach claim 1, Cass does not teach claims 6 and 15, and Altman does not teach claim 21 and 34). As such, the combination of these references with other references cannot possibly be construed to teach the recitations of the various dependent claims. Furthermore, the combination of the respective primary references with the various secondary references cited in the §103 rejections also fail to even suggest the recitations of the respective rejected claims cited by the Office action. Simply put, the prior art of record, whether considered as individual references or in any permissible combination with each other, still fails to teach or suggest the recitations of claims 2, 8-11, 17, 25, and 27-28. Applicants submit that these claims are allowable over the prior art of record.

For at least these additional reasons, applicants submit that all the claims are patentable over the prior art of record. Reconsideration and withdrawal of the rejections in the Office action is respectfully requested and timely allowance of this application is earnestly solicited.

CONCLUSION

In view of the foregoing remarks, it is respectfully submitted that claims 1-38 are patentable over the prior art of record, and that the application is in good and proper form for allowance. A favorable action on the part of the Examiner is earnestly solicited.

If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney at (425) 836-3030.

Respectfully submitted,

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this Response, along with transmittal, Petition for Extension fo Time, Credit Card Payment Form and facsimile cover sheet, are being transmitted by facsimile to the United States Patent and Trademark Office in accordance with 37 C.F.R. 1.6(d) on the date shown below:

Date: September 28, 2005

Albert S. Michalik

2810 Amendment